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ABSTRACT

Presented are suggestions to help the automobile driver attain the saving of fuel and money. Discussed are starting and stopping; anticipation of traffic conditions; use of accessories; trip planning; and accomodation of pedestrians and cyclists. Additional topics covered include systematic car maintenance and safety considerations. (RE)

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Energy Efficiency Handbook for Driver's Education

SE 029 328

This booklet was produced as a cooperative effort between the Nebraska Energy Office and the Nebraska Driver and Safety Education Association. Both of these organizations realize the importance of energy conservation to the individual and the State of Nebraska.

The materials found in this booklet are a combination of materials written all over the United States. The writers felt that information should be gathered from all over and then customized for use in the driver education programs of Nebraska.

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PREFACE

One reason you may be inclined to save fuel is to save money, or your goal may be to help save fuel for tomorrow's drivers. Whatever your reason, you can be sure that what you do does count. You will find that saving highway fuel is not only good for your pocketbook, but is also an experience that will make you feel good.

The driver behind the wheel is in charge of saving or wasting fuel. A car and its driver make up a team. It is the driver who makes the decisions. Experts agree that your driving techniques and habits greatly affect the fuel economy of any make of car. In fact, these experts say that a careful driver should be able to get at least 30% better gas mileage than an "average" driver. The "careful" driver, should get at least 50% better mileage than a "poor" driver.

It makes good sense to develop smart driving techniques and habits. If you drive your car about 10,000 miles per year — as the average driver does — your engine consumes 700 gallons of gasoline. You will have a miles per gallon average of about 14.3. In terms of the metric system, you would be getting about 23 kilometers per gallon or 6 kilometers per liter. Let's say that you are able, through wise-driving techniques, to travel 10,000 miles on 595 gallons which is a fuel reduction of about 15%. Your new averages will be almost 17 mpg, 27 km/g, or km/l, this reduction in fuel, in terms of money (at 59.9 cents per gallon), your savings would amount to $63.00.

Smart drivers do not have moving traffic violations to pay. Neither do they have as many repair bills as the poor driver. The smart driver's car lasts longer and brings higher trade-in value at car-trading time. It not only makes good sense to develop wise-driving techniques to conserve energy, it makes good cents too.

This booklet will offer some suggestions that will help you to be a success in attaining your goal of fuel and money conservation.

TIP 1. MAINTAIN SYSTEMATIC CAR CARE

Unless you are especially alert, some habits which seem to be perfectly innocent can sneak into your driving techniques. These habits are really sneak thieves of your fuel and money economy. For example, it is very easy to form the habit of racing the engine as soon as it starts. This is a wasteful habit and does no one any good. All it does is waste fuel and cost you more money.

Another wasteful habit is that of gunning the engine just before cutting it off. Your engine does not really need extra exercise before resting. In fact, ANY racing of the engine is costly to you in fuel and in money.

Many drivers form the habit of racing their engines when stopped at a red traffic signal or at a stop sign. This is easy to do, but it will take a lot of concentration on your part to avoid forming the habit. Remember that just 30 seconds idling uses more gas that it takes to start the engine. A lot of gasoline is wasted in 15 seconds of engine racing.

The manner in which you operate your car cannot only create savings for you but can also help your fellow drivers save. You can set an example for your family and friends. You can play a part in helping others save by keeping you and your car out of needless tight spots that cause others to have to brake. You can play an important role in safety and economy by clearly indicating your intentions well in advance. Do not cause others to have to apply their brakes because of something that you look like you may do.

You learn about the various systems of a car in your driver's education classes. At the same time, you can learn some ways in which those systems can cause you to lose mileage and money. The number of do-it-yourself-car-services increases each day, so we will explain some things that you can do that will save you fuel and money.

a. The Engine and Fuel System

Your engine's fuel pump is powered by the engine itself. Its function is to pump gasoline from the fuel tank to the engine by way of the carburetor. An average fuel pump pulsates 45,000 times in 30 miles of driving. That is about 20 times as fast as your heart beats while driving 30 miles at 50 mph! A part that works so hard is more apt to develop weaknesses. You should make regular checks for leakage. Such leakage wastes gasoline, causes your engine to operate less efficiently, and demands replacement of the fuel pump.

The purpose of the fuel filter is to keep dirt and water that may have gotten into your gasoline from entering the carburetor. It is not hard to understand why a clogged filter can cause an improper flow of gasoline to the carburetor. That condition will result in inefficient engine operation. The filter should be replaced at intervals of 12,000 miles or sooner if needed.

The proper mixture of vaporized gasoline and air for efficient combustion in the cylinders is supplied by the carburetor. This important part of your car should be checked and adjusted on a regular basis. Wear resulting from age or improper maintenance may cause failure of the carburetor and waste gas. Efficient combustion means more mpg and more savings to you.

The air filter serves the purpose of keeping abrasive dust out of the carburetor and out of the internal parts of the engine. Automobile engines consume about 9,000 or 10,000 times as much air as gasoline. You can see how important it is that the filter is clean. Air filters will get dirty and clogged if they are doing what they were meant to do. When a filter does get clogged, your engine suffocates and delivers far fewer mpg. Under normal conditions, replacement of the air filter is suggested every 24,000 miles. If you drive in severe dust conditions, the filter should be cleaned or replaced more often.

The positive crankcase ventilation valve (PCV) is an important part of your car's antipollution system. The valve recycles unburned gases from the crankcase by returning them to the combustion chambers where they are safely burned. If this valve malfunctions or becomes clogged (and many do), it can cause oil to be drawn into the air filter housing. Oil causes the air filter to become clogged much sooner than usual. This clogging will cause you to lose mileage.

The oil pump forces oil through the oil filter to lubricate all vital parts of the engine. A defective oil pump may be signaled by low oil pressure, engine knock, and a hot engine. Motor oil does more than lubricate the engine. It helps carry away heat from the engine. Poor circulation of oil will result in excess wear (or even complete stoppage — freezing) of moving engine parts. Either one of these results is costly to repair. An engine with badly worn parts wastes fuel.

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The oil filter is very important to your gasoline economy. The filter increases engine life by preventing sludge, metal particles, or other abrasives from reaching moving parts of the engine. This filter should be replaced as recommended by the manufacturer of your car. If your driving consists mainly of short trips, you should have the oil filter replaced every three months.

b. Cooling System

You are not being very "cool" when you neglect your engine's cooling system. Your engine will not be cool either. Even new cars need cooling system attention. A recent study of 1,200 cars revealed that more than one-third of three-year-old models showed signs of corrosion in the cooling systems. The same was true for about one-third of the two-year-old models and for one-fifth of the one-year-old models. How do you think "old" cars would have checked out if they had been included in the study?

The demand for smaller, more efficient cars has imposed a need for smaller engines. To come up with performances comparable to the "standard" car of the past, designers have had to make today's smaller engines work harder. When an engine works harder, it generates more heat. About one-third of the heat generated by today's internal combustion engine must be taken away from the engine block and transferred to the outside air. Your car's cooling system bears the biggest part of that responsibility.

Car engines work more efficiently at high rather than low temperatures. Efficiency means more mpg so you will want your engine to maintain its optimum temperature. To help you do this, designers have come up with pressurized cooling systems in which the radiator cap and contents of the system play major roles. Today's ethylene glycol-based coolants protect the engine from two severe hazards: boiling and freezing. For years the mixture that we added to radiators in cold weather was called antifreeze but, with the pressurized systems of today, it has to be an anti-surge, anti-foam, anti-steam, anti-corrosion, anti-boil antifreeze.

In a cooling system that is pressurized to about 15 pounds per square inch, a 50-50 mixture of water and a reliable coolant will raise the boiling point to about 265°F (129°C) and will lower the freezing point to about -34°F (-36°C). Therefore, your engine can operate at temperatures above the boiling point for water. In such temperatures ranges, the engine performs more efficiently.

The old idea about "permanent" antifreeze has become obsolete. It is true that a cooling system filled with a mixture such as was described before will protect the engine from freezing year after year. It is also true that the higher temperatures of today's engines tend to break down corrosion inhibitors more quickly. Today it is suggested that you have the cooling system flushed and the coolant changed at least once a year. If this is done on a yearly basis, a good time to have it done is before a summer vacation.

We will now look at some of the components of the cooling system and learn what can be done to maintain best performance.

1. Water Pump

The water pump forces the coolant through the engine block. There it picks up heat generated by the various moving parts and returns it to the radiator where the heat is passed off to outside air. A worn-out seal or a worn moving part of the pump will result in leakage. Telltale spots on the driveway where a car has been parked signal an alert driver that the car has water pump problems. Another sympton is excessive noise in the engine. Of course, a boil over lets the driver know that something is wrong.

2. Fan Belt

The water pump is driven by the fan belt. You can inspect the fan belt by pushing downward on its middle part between pulleys. The belt should not give more than one-half inch. Before you reach for a wrench to tighten a loosened belt (or even if the belt is not loose), turn the belt over so that you can inspect the underside for cracks, brittle spots, or signs of corrosion. These signs indicate that the belt may be nearing its breaking point. If there is any doubt, the belt should be replaced.

3. Radiator Cap

That little lid on top of the radiator is the key to the pressurized cooling system. It also seals the proper amount of pressure and releases excess pressure. Under its watchful eye, radiator pressure that will allow the engine to run safely at the designed temperature is maintained. A leaking radiator cap leads to engine overheating, and overheating leads to possible breakdowns. The radiator cap should never be removed when the engine is hot.

4. Hoses

There are four hoses in the cooling system that you will want to inspect at least twice a year. In the spring and in the fall are times suggested. These hoses are: the hose that sends water to the engine (located at the bottom of the radiator), the hose that returns water to the radiator from the engine (located at the top of the radiator), and the pair of hoses that send water to (and return water from) the passenger compartment's heater.

Each of these hoses is subjected to internal pressure as well as the externally deteriorating effects of heat, oil, grease, and harmful chemical agents. If the hoses are brittle or show signs of cracking, they should be replaced. As with the fan belt, if in doubt, throw it out.

5. Engine Thermostat

The engine thermostat maintains proper temperature of the coolant. A defective thermostat could cause slow warm-up (a fuel waste) or an engine failure. The thermostat should be checked when you inspect the hoses.

c. Tires, Steering, and Suspension

Of all the parts of a car that often need replacement, tires are one of the most expensive. If you realize how important tires are to us as our only contact with the road, you will understand that the money spent for tires is money well-spent. We rely on our tires to start us rolling, to keep us rolling, and to stop our rolling when needed.

There are three major types of tire construction offered by most maufacturers. These types are bias-ply, belted-bias, and radial.

Bias-ply is the conventional-type tire that has been sold for many years. The simplicity of bias-ply construction allows manufacturers to produce dependable, inexpensive tires as well as premium, high-performance, and long-mileage tires.

Belted-bias tires are constructed by adding high strength belts under the tread area of a bias-type tire. The belts improve mileage, traction, and impact-resistance.

Radial tires, in addition to offering the longest mileage of the three types of construction, offer considerable improvement in handling and cornering control. Radials are more resistant to impacts and bruises and offer better traction and potential savings in fuel costs.

Your tires will serve you well only if you take care of them. Tire care is really rather simple. The hard thing about taking care of your tires is simply making yourself do it.

Proper inflation, as recommended by the car manufacturer, is very important to your fuel economy. Improper inflation will decrease fuel economy and increase tire wear. You should check the pressure at least once a month. You cannot check the pressure too often. Since heat is generated as the tire rolls, it will cause the pressure of your tires to change when they are cool. Checking the tire pressure means more than going by the tires' appearance. Instead you should use a pressure gauge. Also, checking the tire pressure means that you immediately adjust the pressure to the proper specifications.

Tire valves permit you to add air to underinflated tires or to release air from overinflated tires. The valve stem is generally made of rubber. When tires roll as you drive, the valve stem is exposed to extreme heat, road chemicals, and natural deterioration. If the stem begins to crack, air seepage may occur causing you to lose mileage and tire-life. Of course, if you check the pressure as frequently as you should, you can inspect the stem at the same time. Replace any that appear to be cracking.

If a tire and wheel assembly is out-of-balance, the condition should be corrected at once. If the out-of-balance conditions is not corrected, it can result in cutting the tire's life in half. It also results in annoying car bounce and vibration. Annoying though they may be, if your car develops vibrations and bounce, have the balance of your wheels checked at once.

The front and rear tires on your car wear differently under normal driving conditions. On most cars, the front tires steer the car and absorb the brunt of harsh cornering forces while the rear tires deliver the drive force. An uneven distribution of weight can cause the tires on one side of the car to wear differently than those on the other side. To equalize wear, and increase tire mileage, you should rotate the tires in the manner and at the times recommended by the car manufacturer.

The front wheels of your car should always point in the exact direction you are steering. If they do not, rapid and uneven front tire wear will result. Such misalignment should be corrected at once. Misalignment can be caused by several things. Worn steering and suspension parts may be the cause. Simple, easy to forget occurrences such as hitting a chuck hole in the road or bumping into a curb can knock your front wheels out of proper alignment.

While we are looking at the "feet" on your car, let's not forget to make sure that your wheels are properly aligned. Improper front wheel toe-in can increase fuel consumption by 0.3 miles per gallon.

The components that make up the steering and suspension systems directly affect tire-life. As noted above, worn parts can lead to misalignment of the front wheels. Parts such as ball joints, idler arms, and shock absorbers may need replacement to help you obtain the best performance from your tires and gasoline.

d. The Power Train

The function of the power train is to transmit power developed by the engine to the car's driving wheels. Any weakness in the system which causes the maximum power to fail to be delivered to the wheels is a waste of fuel and money.

The transmission sends power to the drive shaft, and the drive shaft sends power to the differential which sends the power to the driving axles and wheels. There are two general types of transmission problems: a slipping clutch due to improper adjustment or a burned out clutch, which is a real gas waster due to engine race during periods of slippage. At the first hint of a slipping clutch, get your car to your mechanic. If you are a do-it-yourself mechanic, get to work at once and be certain that you have a service manual for your particular car make and model.

An automatic transmission is generally one of the most reliable systems in a car. If your automatic transmission begins to slip, you are being robbed of gasoline efficiency. Tackling an automatic transmission is a "no-no" for most do-it-yourself mechanics because they lack the necessary tools and gauges. Even if you do not plan to undertake repairs yourself, there are a few checks that you can make to help determine if your car needs internal transmission work.

You can check and correct the transmission fluid level. You can check for leaks if the fluid level frequently drops. An effective way to check for leaks of transmission fluid (also brake fluid, gasoline, oil, and water) is to put a large piece of paper under your car while the car sits overnight. If the paper shows evidence of leaks and you are not able to determine the source, take the paper to your mechanic, for it will help identify and locate the leaks.

Noise from the rear of your car may or may not indicate internal problems with the differential. Should it develop that you do have internal trouble with the differential, you will want to have the situation corrected at once.

You can do some checking to determine the source of the noise. With the engine warmed up, you should shut off all accessories and try to isolate the source of the noise. If the noise is continuous and varies with speed and changes pitch on varying roads, it is probably produced by your tires. If the noise disappears in one range of the transmission but returns in the other, then the noise is coming from the transmission.

Make a note of the road speed at which the noise is loudest. With the car stopped and the transmission in neutral, increase the engine speed until it appears to be at about the noted speed. If the noise is heard, the exhaust system or the engine is probably the source of the problem.

As you drive, apply the brakes gently while holding the car speed steady. If the noise varies in pitch, the problem is probably in a wheel or in an axle shaft bearing. To verify this clue, swerve the car sharply so that the body weight is shifted from one side to the other. A defective bearing will howl even louder when under pressure.

Should the noise tend to fade at speeds under 30 mph, you might just have differential problems. You can check this suspicion by driving at the speed at which the noise is most prominent and then coast. If the pitch of the noise is changed, the noise is coming from the differential.

e. Lubrication System

When you get right down to rating importance of the various systems of the automobile, you have the same problem as trying to decide which leg of a three-legged stool is most important. The lubrication system would certainly have to rank high, especially if you are concerned with performance and fuel economy.

An important component in the lubrication system is the oil filter. This filter does the job of preventing dirt from entering the internal parts of the engine. If it does its job, it will become clogged. The filter should be replaced as recommended by the car manufacturer.

You may notice that your car seems to be burning too much oil. You may as well face the fact that some new (or overhauled) engines are oil consumers because of production or repair errors. It is possible for such an engine to come from the manufacturer with a defective rear or front oil seal. Piston

rings may have been improperly installed or the engine may have a defective oil pan gasket. If you can verify the loss of significant amounts of oil due to a defective product, no reputable mechanic or manufacturer will refuse to take steps to remedy the situation.

Another reason that new or overhauled engines may show abnormal oil consumption is that some drivers "baby" such engines. The cyclinder walls in a new engine are smooth and about 1,000 miles of driving are required to "seat" the piston rings so that oil is prevented from slipping by. However, if the driving is too cautious during this period, the rings may never seat. Babying an engine can cause glaze to build up between the cylinder walls and the piston rings which will prevent effective sealing. If this happens, the engine must be dismantled, the cylinder must be honed, and the piston rings replaced to solve the problem. That would be expensive — and an unnecessary expense at that!

When breaking in a new engine, you should follow the recommendations listed in the owner's guide. Most newer cars should be driven at speeds less than 55 mph for the first 200 miles. If your driving of a new engine is confined to city driving, drive your car on a highway at the speed limit for about 10 minutes every day or so. To do otherwise will make you a likely prospect for a major repair job.

Due to the wear they have sustained, older engines may be expected to use more oil than a well "broken-in" new one. There are many repairable or replaceable parts that will reduce oil consumption. Worn valve guide seals, worn piston rings, scored cylinder walls, worn piston ring grooves, worn pistons, or clogged oil-return slots are some examples.

Internal engine problems are not the only cause of oil loss. This fact applies to both new and older engines. Take the time to make, or have made, a few careful checks before you send your engine to the shop to have it torn apart.

First, be certain that you are using the oil recommended by the manufacturer of your car. Be certain too, that the oil in the engine is at the recommended capacity. Sometimes, since manufacturers usually produce several different models of their product (they produce several different dipsticks), the wrong dipstick may be put into a car. The result? You may be underfilling or overfilling with oil.

After your car engine has been fully warmed up, place papers on the driveway beneath the engine. If spots show up or if you find fresh oil on the underside of the engine, you have a leak to look for and have repaired. Good places to check include the oil filter connection, the oil pan, front and rear oil seals, valve covers, and the timing chain cover.

Get a friend to follow you as you drive to check your exhaust smoke when your car accelerates. Excessive consumption of oil is indicated by bluish-gray smoke — not black or white. White smoke is simply condensation being expelled, while black smoke indicates the burning of an overly rich fuel mixture.

Replace the positive crankcase ventilation valve if it is clogged or defective. As mentioned before, a defective PCV valve can cause oil to be drawn into the air filter housing. Check the air filter housing. If oil is present, you have a tip-off of PCV trouble.

You should not ignore consistently low oil pressure. Neither should you dismiss it when your engine takes a long time to reach an acceptable oil pressure. On the other hand, there is no need to push the panic button.

When you have low oil pressure in addition to oil loss, you can suspect defective camshaft bearings. If that is the case, you are in for an engine overhaul. But the low pressure could come from other less traumatic causes. Of course, you will not want to run your engine if low pressure is indicated. To run the engine could result in "freezing" of internal moving parts.

Check the oil level. Examine the oil on the dipstick. If the oil appears thin or diluted, change the oil and recheck the pressure.

Since dirty oil can seriously damage engine parts and cause friction and wear that will rob you of gasoline mileage, you should change oil and filter at the intervals recommended in your owner's manual. A worn engine that burns oil will require frequent tuning and will get progressively poorer gas mileage.

Use a good quality multigrade oil recommended by the manufacturer of your car. A recommended chart, which lists different oils for different climates, comes with the owner's manual. Do not use an oil of higher viscosity than that recommended in your owner's manual. Heavier oils tend to increase friction and, by doing so, they reduce your miles per gallon.

There are times when indicator lamps in the instrument panel will show low oil pressure because the sending terminal is not clean. It may also be that the sending unit is not operating properly. A couple of dollars to replace a sending unit surely beats the cost of a major overhaul. If this does not correct the situation, change the oil filter.

Before you have that engine taken apart, check or have checked the pressure of the oil pump. Parts of the pump may have become stuck. Check the oil pump suction tube, which may be cracked, bent or loose. Your next alternative is internal engine work.

Many drivers have become do-it-yourself oil changers. Two problems may follow as a result. First, do not forget to put the drainage plug back into place before putting the new oil in. Second, and this is both an ecology and conservation problem, how are you going to dispose of the used oil? It has been estimated that 500 million quarts of used oil are thrown away each year. "Thrown away" means that the old oil is poured out on the ground to pollute water sources. Such used oil can be re-refined and used again. For some reason, the number of re-refineries in the United States has dropped from more than 100 in 1965 to less than 50 in 1977.

As was suggested earlier, the driving team consists of the car and the driver. Just as you, the driver, are the coach of your team while in action, you, the driver, also must serve as the team's trainer. That is, how efficiently your car performs for you is a direct result of how well you look after your car and all its systems. A carefully executed maintenance program can save you mileage and costly repairs.

You should keep your car engine tuned according to the specifications in your owner's manual. If your manual has been misplaced, the following plan is suggested: every 10,000 miles, a major tune-up is in order. That means:

* Install new spark plugs, ignition points, and condenser.
* Clean or replace the positive crankcase ventilating (PCV) valve and remove sludge or gum from the hoses.
* Check all electrical ignition circuits and connections for voltage drop and resistance. Clean, tighten, and replace them as needed.
* Inspect the choke for proper operation.
* Set the timing to the manufacturer's specifications.
* Check the ignition advance mechanism.
* Remove foreign matter from the exhaust gas recirculatory valve and hoses and check the controls according to the manufacturer's specifications.
* Check the exhaust system for blockage.
* Replace air and fuel filter elements.
* Check for fuel leaks at carburetor, fuel pump, gas line, and gas tank.

About 5,000 miles after the major tune-up, a minor tune-up should be performed. This may involve cleaning the plugs, adjusting points, and adjusting timing if necessary.

At least once a month, check the pressure in your tires. For best gas mileage and for driving on long trips with heavy loads, you may want to inflate your tires three to four pounds above the recommended pressure, but do not exceed 32 pounds per square inch.

Americans are dumping many dollars in fuel economy and in rapid tread wear by improper inflation. Some people have been known to underinflate their tires to cushion the ride. The Rubber Manufacturers Association states that underinflation by 4 to 12 pounds can cut treadlife by 10% to 40%. Overinflaction will also decrease tread-life. Common indicators of mileage being lost are rapid tread wear in the center of the tire (overinflation) or on the outside edges of the tread (underinflation). Remember that your tires are your only contact with the road.

When the time comes to replace your tires, you will probably want to consider buying radial tires. Radials generally have a higher original cost than the bias-belted tires, but in the long run, that is offset in mileage gains (.5 to 1 more mile per gallon) and longer tread-life.

Also, check to see if your brakes are properly adjusted. The need for having brakes to stop your car is obvious. In addition, if your brakes do not release properly, they will rob you of gasoline economy.

You may consider the purchase and installation of a manifold vacuum gauge. Such a gauge can help teach you good driving habits by visually indicating the vacuum in the intake manifold which is directly related to gas efficiency. To increase your gas mileage, learn to drive so that you achieve a high vacuum reading on the gauge.

LEARNING ACTIVITIES

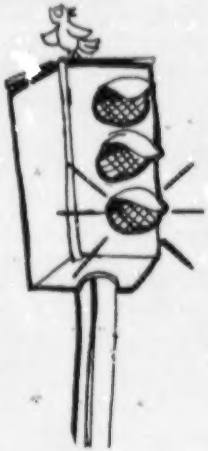
Tip 1.

1. Try to think of at least three gas-wasting habits that are not mentioned in the text.
2. Consider racing the engine as six times more fuel-costly than idling. Estimate how much fuel and money a driver loses by racing his/her engine for six seconds each time they shut it off in a year's time. Defend your estimate.
3. Drivers have the habit of resting a foot on the brake pedal while they drive. Explain how this is fuel-costly.
4. Conduct observations over at least a one-week period and make notes of instances in which you see drivers causing other drivers to brake unnecessarily. Classify these observations.
5. Explain why using the brakes to hold your car in position while waiting for a red signal on an upgrade saves fuel.
6. Why does driving in dusty conditions necessitate more frequent changes of the air filter?
7. Give several reasons why the oil filter should be changed frequently.
8. How does a pressurized cooling system allow an engine to operate at higher temperatures?
9. Make an exhibit of dangerous belts from an engine. Tell how to check belts and what symptoms to look for when checking.
10. Make a drawing showing the differences in construction of bias-ply, belted-bias, and radial car tires.

TIP 2. AVOID SUDDEN STARTS AND STOPS

The smart-person-behind-the-wheel saves fuel, the car, and money by avoiding "jack rabbit" starts. The driver who has to be "the first" out of the starting gate when a red signal turns green may think that it is smart. You may be laughed at if you are a smart driver who accelerates in a sensible way. But, while the other driver laughs, you can cry all the way to the bank with the money you have saved.

There are two instances in which you should not accelerate gently. One is when you are entering a high-speed traffic lane and the other is when you are passing another vehicle.



Jerky acceleration or "hot rod" driving can increase fuel consumption by two mph in city driving. "Getting a wheel" or "scratching off" not only uses extra fuel, it also subjects all of your car's systems to unneeded abuse.

When a traffic signal far ahead of you turns red, think ahead by removing your foot from the accelerator pedal at once. There is a good chance that the light will have changed to green by the time you get to the signal. Even if it hasn't, you save fuel by coasting. The car's kinetic energy maintains propulsion instead of burning additional fuel. Too, there will be less kinetic energy to be dissipated (changed to heat energy and exchanged with surrounding air) if you have to brake and stop.

Don't "tailgate." Although professional race drivers tailgate to gain the benefit of drafting, there are no such benefits for the private passenger car driver on highways or city streets. Indeed there are many disadvantages to

the practice. Frequent braking situations may arise. You may hit the car ahead and be charged with following too closely. You may cause yourself to be injured or you may cause injury to someone else.

If you see a possible braking situation developing ahead of you, treat it as if it were a red traffic signal — take your foot off the accelerator pedal. For example, you may notice a driver well ahead of you signaling for a left turn. Or you may see a ball roll across the roadway. If you do, let up on the gas because, in most cases, a ball crossing the road will soon be followed by a child. Every time you use your brakes to slow your car, you are wasting the energy that was used to get the car moving at the speed it had before braking.

If your car has a manual shift, run through the lower gears gently and quickly. Generally, you use the lower ranges (first and second) to gain momentum, then you use your higher gears (third and fourth) to maintain that momentum. Since cars deliver less mpg in the lower ranges, you want to "up shift" as quickly as you can.

In a car that has an automatic transmission, apply just enough gas pedal pressure to get the car rolling; then let off the pedal slightly to allow the transmission to ease into high range. With just a little bit of practice, you will "sense" when to let the transmission shift.

Following these suggestions will not only net you more mpg, but will also net you more money in your pocket.

LEARNING ACTIVITIES

Tip 2.

1. Describe from memory or imagination some things that could result in wasting fuel as a result of "tailgating" (include at least three things).
2. Tell how a driver who lets the car coast in gear as it approaches a red traffic signal is saving fuel.
3. Why does unnecessary braking use additional fuel?
4. How should one drive when entering a high-speed traffic lane?
5. Why should you not accelerate gently when overtaking (passing a car) on a two-lane highway?
6. "Getting a wheel" and "scratching off" uses extra fuel and causes additional wear on which parts of the car?
7. Look up the meaning of the word "momentum" and report to the class.
8. Explain why cars, trucks, and even motorcycles use more fuel in lower gear ranges than in higher ranges.

TIP 3. ANTICIPATE TRAFFIC CONDITIONS

A car traveling at 55 mph gets better gas mileage than at 70 mph. At 45 mph, the mpg is even better. You might suppose, then, at 20 mph the mpg would be increased. That is not the case. Expert researchers have found that private passenger automobiles obtain their best mpg in the speed range of 35 mph to 55 mph.

The main factor in high speed consumption of fuel is wind resistance. If a driver-car team averages 20 mpg at 50 mph, it will lose about 6½ mpg when its speed increases to 70 mph. With most cars, the loss in mpg is about one mpg for each five mph over 50.

On a trip of 150 miles, if 20 mpg are obtained at 50 mph, about 7½ gallons of gasoline are used. The trip takes about three hours and the fuel cost is approximately $7.50. The same trip, at 55 mph, would use about nine gallons of fuel and would take about two hours and 42 minutes. The cost of fuel would be about $9.00. A time savings of only 18 minutes would cost about 13.5 cents per minute.

As long as traffic conditions permit, hold a steady foot pressure on the accelerator pedal. This is really important on the highways since "seesawing" (repeatedly varying your speed by as little as five mph) can cut as much as 1.3 mpg from your fuel economy.

An engine that is idling is wasting fuel. It is clear that if your car is using gasoline and is not moving, your mpg is zero. The whole idea of transportation is to move. The main purpose of the private passenger car is to move the driver and the passengers from one place to another.

The average American car uses about a cup of fuel for every six minutes that is stands idling. Experts suggest that you shut off your engine if you are going to sit without moving for more than a couple of minutes. Usually, you can restart your warm engine with less fuel than is used while idling.

There are some situation in which it is smart to shut off the engine. Some examples are (1) while waiting for a long train to clear a grade crossing, (2) while waiting for a drawbridge to close, (3) while waiting for construction work, (4) while waiting for a passenger to "just run in" a store, and (5) while waiting in line at a drive-in window.

Many people feel that it is harmful to move a car before the engine is fully warmed up. Owner's manuals for older cars recommended a complete warm-up. Recent studies have shown that a car can be safely operated immediately after starting a cold engine. In addition, it has been found that an engine warms up much quicker while under a strain. While you will want to drive slowly the first few blocks, there is no need to worry about internal engine damage resulting from a rolling warm-up.

Some drivers may use an idling warm-up as an excuse to provide for their own personal comfort. These drivers will start their cars on a winter morning, turn on the defroster and the heater, and dash back to the kitchen for another cup of coffee while the engine warms up. Of course, they know that the eingine is not only warmig up, but it is also warming up the driver's compartment while heat from the defroster "scrapes" ice off the windshield.

The savings in both fuel and money would be considerable if such drivers would dress more warmly and take to using scrapers on their windshield and windows. By doing this, they not only save fuel and money, but also learn how things warm up faster under the strain of work.

LEARNING ACTIVITIES

Tip 3.

1. "Time" yourself at a red traffic signal. How long did you idle? How much fuel was wasted?
2. Maintain an "Idling Log" for one week. How much fuel was consumed while your engine was idling?
3. Prepare a chart or bulletin board showing things that a driver can do in cold weather to save idling fuel.
4. Explain why the driver who starts his engine in the morning and lets the heater run until the passenger compartment is warm, is not being wise in fuel economy.
5. Make a chart showing several ways (at least four) that a smart driver can save fuel when starting the car on a cold morning.
6. Give at least two traffic conditions which will not permit holding a steady foot on the accelerator.
7. Explain how a cruise control device works on a car. How does it save fuel?
8. In what kinds of traffic situations would you have to work hardest to maintain steady speeds?
9. Tell how wind resistance influences fuel consumption.
10. Explain how hurrying to a destination will demand the use of extra fuel.

TIP 4. AVOID EXCESSIVE USE OF ACCESSORIES

Many cars of today are equipped with air conditioners to make the passengers more comfortable in hot weather. When you realize that an air conditioner can reduce your mileage as much as 2.5 mpg, you will see that wise use of such a device can provide you comfort without excessive waste.

Suppose your car has been sitting closed in the sun during the summer. That is, your car is HOT when you open it. Instead of starting it, turning on the A/C, and driving off, you might consider lowering the windows for a few minutes in order to let the trapped heat dissipate. As a matter of fact, especially if the car has power windows, you might consider lowering all windows and driving off immediately. The exchange of heat between the air inside the car and that on the outside goes faster when the car is moving. Finally, why not lose some of the trapped hot air before turning on the air conditioner?

When you have raised the windows and turned the air conditioner on, let the unit work to cool things down. Then turn the unit off and use the car's fresh air ventilation system. Should this practice result in your personal discomfort, try setting the air conditioner fan control at its lowest level.

LEARNING ACTIVITIES

Tip 4.

1. Make a "computer" flow chart of the procedures and decisions involved when starting and driving off in a car that has become hot inside while being parked.
2. What effect can tinted glass in a car have on air conditioning and fuel consumption?
3. What are some alternatives to keeping cool instead of running the air conditioner all the time?

TIP 5. PLAN YOUR TRIPS CAREFULLY

The word "trip" usually makes us think of long mileage excursions that last a long time. This is not always true since every time you move your car, you are making a trip. It takes energy to make things move, so you will want to consider saving fuel and money on all your trips by getting the most mileage from each gallon of fuel you cause your car to use.

a. Long Trips

When you get ready to make a long trip such as a vacation, a football game in Lincoln or Kansas City, or Denver for business, you should plan ahead for fuel economy.

City driving takes about twice as much gasoline as expressway driving. You will want to select a route to your destination that will let you take advantage of the difference. You will want to avoid going through cities. If it is not possible for you to bypass a large city, you will want to arrange your departure so that you will arrive at the city at an "off" hour traffic-wise. City traffic is usually heaviest in the mornings at "going to work time" and in the afternoons at "getting home time". Even interstate highways around cities become jammed at those hours. Keep in mind that when you get stuck in a traffic jam, you are getting zero miles per gallon.

Road construction work often involves long delays. They may cause you to be rerouted onto inferior streets or highways. You will want to pick a route that avoids construction work.

The route you choose should have a minimum of stop signs, traffic signals, and left turns. Even though more and more intersections are being equipped with left-turn lanes, there are still many that do not have them. Some fellow driver may cause you delay (and fuel waste) by holding up traffic as he/she waits to make a turn across traffic.

The season of the year and the day of the week may affect your fuel economy on a long trip. Traffic becomes heavy around the beaches and lakes in the summer months.

If it is possible, you will want to avoid routes that will take you over railroad grade crossings. Freight trains running on the main lines frequently can cause you to have a delay of several minutes.

Unless you are going to attend such an event, you will want to avoid college and university towns during football and basketball seasons on game days. This is especially true just before game-time and for several hours after a game. Your plans should include routes that will miss, for example, Lincoln during the State Fair, Omaha and Grand Island on race days, or Lincoln during basketball tournament time. You should expect, and will find, crowded and delaying conditions.

If you are going to drive to events such as those mentioned above, we hope you will car pool and that you, as the driver, will have "psyched" yourself up (both mentally and physically) for the snail's-paced, bumper-to-bumper conditions that you will experience.

Should you be making a trip that required you to trail a boat, a motorcycle, a camper, or a utility trailer, you can count on reduced mileage as a result of "drag". You can, however, maximize fuel economy by seeing that your car is equipped with the recommended engine, transmission, axle-ratio, and suspension components. You can also gain some miles per gallon by observing carefully instructions for loading the trailer.

Plan to take all that you need for an enjoyable trip, but limit what you load into your car's passenger and trunk compartments. Fuel economy is reduced about 1% for each 100 pounds of extra load in city driving. Tire chains, shovels, sand, etc., should be left at home except when weather conditions anticipate their being needed. Don't go "overboard" in reducing weight by leaving your properly inflated spare tire, jack and other tire-changing tools at home. Also, you will want to check to see that the electrical/gas appliances, gas heater, water faucets and water heater, range, etc. are left in a safe condition (either on or off) before you leave. Doubling back to pick up forgotten items or to turn utilities off or on is doubly costly in fuel and money.

If you are going to a place that is "new" to you, and you are not sure of local directions, stop several miles before you "get close". Use a telephone or ask someone for directions. It is frustrating and "fuelish" to drive several miles in search of a place only to find that you have passed right by it several times. The wisest thing to do is to obtain clearly written directions before leaving home. If you have a C.B., use it for asking directions.

A long trip that has been well-planned and that has been driven wisely is more than likely to be much more enjoyable to all concerned than a trip that is "thrown together" on the spur of the moment.

b. Short Trips

Many of the points to consider when planning a long trip also apply to short trips. Trips of four to five miles or less are fuel costly. Automobile engines are more efficient at high temperatures than when they are cold. Short trips do not give the engine time enough to get really warm. Therefore, the best advice about short trips is to avoid making them!

Often it is not possible to avoid short trips. Sometimes the need for a short trip is almost spontaneous. No one expects a driver who is out of milk and bread to choose between the discomfort of hunger and the conservation of fuel. No one expects such a driver to walk a mile and a half to the nearest store in a downpour just to save fuel. Drivers or persons responsible for buying groceries might want to ask themselves a questions or two: "Why didn't I buy the milk and bread on my last shopping trip?" or "I knew we were running low. Why didn't I get those items yesterday?"

Short-trip planning is hidden in many of our day-to-day decisions. You want to train yourself to make every drop of fuel count as much as possible. For example, while you have parked to pick up the bread and milk, could you pick up the dry cleaning just across the street?

Try to put as many short trips together as possible Eliminate doubling back over the same route. Another thing that you can consider for your short trips is alternative transportation. Some alternatives are walking and riding a bike. When you get right down to it, short trips need as much planning as long trips.

There are many people who believe anything they see in print (except for "Wet Paint" signs). We hope that you are not one of them. You should not take it for granted that these suggestions always work. You should see for yourself that the suggestions really do save fuel and money. Keep some simple records and see for yourself!!

Records of your operating costs and mpg are easy to keep and can be interesting and fun as well as being informative. Some office supply stores and book stores offer printed record-keeping books but you can "make do" with a record system that requires nothing more than a small note pad. You should make certain that your note pad will fit into the dashboard compartment. You should also keep a pen or pencil in that compartment with the book.

All you have to do to find your own miles per gallon and cost is to follow this simple procedure:

a. First fill your tank and make a note of the odometer reading.
b. Drive according to the suggestions until you need more fuel.
c. Get more gasoline. This time record the number of gallons required to fill the tank. (Get fill-ups for three or four times.) Also note the odometer reading and the cost of the gas plus oil or other expenses.
d. Determine the number of miles driven between fill-ups by subtracting the first odometer reading (from step a.) from the second reading (from step b.).

e. Divide the number of miles driven (from step d.) by the number of gallons bought (from step c.). The answer to the division is your own mpg for the period between fill-ups.

f. To find out what your operating cost per mile may be, do the following:
   (1) Add all your gasoline purchases (money spent) and what you have spent for other operating costs.
   (2) Divide the amount of money spent by the number of miles driven (from step d.). The answer will be your cost per mile.

Formulas for determining mpg and cost per mile (cpm) follow:

$$\text{mpg} = \frac{\text{second odometer reading minus first odometer reading}}{\text{number of gallons}}$$

$$\text{cpm} = \frac{\text{amount spent}}{\text{second odometer reading minus first odometer reading}}$$

Since hand-held calculators are readily available and cheap, you may want to buy one to keep in your dashboard compartment to make these calculations more quickly and easily. You should keep such a record for at least eight or ten weeks.

These are two factors that greatly affect your mpg over which you have little or no control. Clearly, the area in which you normally live, will dictate to some extent the kind of traveling you have to do. About the only choice that you have to bring about a general change in where you drive is to move. You also have very little control over the climate in which you drive. Snow-prone regions are going to cause you to drive in snow and ice. Dusty areas will cause you to drive in dust.

a. Where You Drive

Roads differ even within a given geographic region. There are excellent roads, good roads, so-so roads, and bad roads in every region. Generally, there is road construction and/or repair work from time-to-time in every locality. You should, if you haven't done so already, determine which roads are which in your vicinity.

Unimproved roads, those that are merely dirt roads, are generally much more costly in mpg than other kinds. The weight of vehicles traveling them causes these roads to have ruts quickly and often. A road that has ruts costs you more mpg to travel. Sandy roads, such as those in the sandhills region, especially when dry, can cause you to become stuck which wastes fuel, money, and nerves. By the same token, clay roads in the eastern part of Nebraska, especially when wet, can cause you to become stuck. Both kinds

of road surface can cause skidding and both kinds are subject to major erosion. In addition, dirt roads generally create dusty conditions which are harmful to your engine's health.

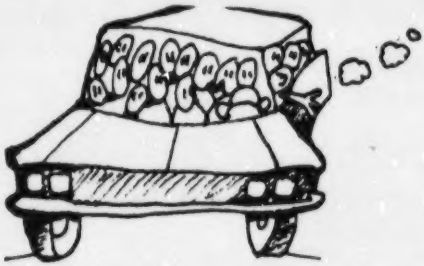
Gravel roads are some improvement over unimproved roads. These roads are covered with loose gravel or with gravel that is held together by heavy oil. Loose gravel roads can cause spinning of wheels on acceleration. Pieces of the gravel may become embedded in a tire tread. Also, your wheels may fling pieces of gravel into the windshield of a vehicle behind you.

Roads that are paved with asphalt or concrete are usually more durable and contribute to higher mpg. Even such hard-surfaced roads may be a factor in tire life. Researchers believe that large regional differences in tread wear are related primariiy to materials used in highway construction, chiefly the stone aggregate materials. Even if you do not move from the area in which you live, you can contribute to your car's mpg by avoiding the bad roads when possible, planning to miss construction or repairs on roadways, selecting alternate routes to miss broken pavement, and by driving sensibly on less preferred roads when forced to do so.

b. When You Drive

Weather conditions such as temperature, wind, and precipitation can affect your mpg. Unfortunately, where mpg is concerned, many times when the use of your car is most helpful, the climatic conditions are very dangerous. For example, driving in heavy fog or rain cuts down on the mpg, but those conditions often necessitate the use of your car.

Unless you decide to move away to other climatic conditions, the best you can do, in the fuel-economy sense, is to use common sense about when to drive. Generally, a good rule-of-thumb is to stay where you are unless a trip is really necessary. If you must drive in adverse conditions, do so with caution and with good sense. Almost any decision that you make that might imperil your safety will cost you mpg.



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LEARNING ACTIVITIES

Tip 5.

1. In your own area, what criteria do you use to rate roads as excellent, good, so-so, and bad?
2. Give at least two reasons why "unimproved" roads are fuel-costly.
3. Observe your own region for a two-week period. Which roads would you pick as being excellent?
4. Explain how keeping records can show drivers that they are saving money and fuel.
5. Distinguish between a "speedometer" reading and an "odometer" reading.
6. Why, in determining miles traveled between the first fill-up and the second, do we subtract the first reading from the second?
7. Miles per gallon (mpg) is determined by dividing the number of gallons into the number of miles. Why?
8. Prepare a list of fixed expenses against a list of unfixed expenses. Include at least three in each category.
9. Make a calendar for the year showing areas to avoid at various times unless the driver is attending the function(s).
10. Religiously maintain a trip log for a period of two or more weeks. Classify each trip as "short or long," "planned or unplanned," "necessary or unnecessary."
11. Obtain a road map of Nebraska and plan a route for some trip of at least 200 miles (all within Nebraska). Defend your route selection as well as your estimated time of departure (ETD) and your estimated time of arrival (ETA).
12. Visit a roadwork project in your area in which flagmen are used: make a good, solid estimate of gasoline wasted while cars wait. Make your observation for at least 30 minutes.

TIP 6. CONSIDER THE PEDESTRIAN AND CYCLIST

When you walk or ride a bicycle as an alternative to driving, you are saving fuel. While you are walking or riding your bicycle, there are some things that you can do — or keep from doing — that will help those who are driving save fuel. Of course, when you help drivers save fuel, you are acting positively to assure that you will have fuel to use in your car.

a. As A Pedestrian

Even though you drive your car to a given place, you will usually have to do some walking. Your help to other drivers in such cases begins when you stop being a driver and are about to become a pedestrian.

Before you open the door on the driver's side of your car, look behind you. If traffic is aproaching, give it the right-of-way. When a driver opens the door as traffic is approaching, other drivers will have to slow down. (Recall the waste of fuel involved in braking.) While the other drivers do not want to hit you, they may be unable to do otherwise. A look to the rear will help the other drivers save fuel and will help you save some arms, legs, heads, and car doors.

When performing the simple act of crossing a street or highway, you can help your fellow drivers save fuel. There are several things that you should think about. For example, if you wish to cross a business district street, use crosswalks that are provided at traffic signal-controlled intersections. If there are cars coming from your left at a right-turn-on-red corner, it will cause but little inconvenience to yield your right-of-way. You can signal to such drivers that you are going to wait and let them make their turn.

When crossing a highway as a pedestrian, you are in a position to help drivers save fuel. Allow yourself plenty of time to cross safely. Failure to do so may cause drivers to brake and that wastes fuel.

Another thing that you, as a pedestrian, can do to help others keep from wasting fuel is to avoid making any movement that oncoming traffic may interpret as an intention to disrupt the traffic flow. Use sidewalks or walk well away from the roadway.

Should you be walking in a group, keep from engaging in horseplay. A friendly shove can send someone in the group into the path of traffic, causing an approaching vehicle to brake, lose fuel economy, and its operator to become angry. It may also cause the one shoved to break legs, arms or head.

b. As A Bicyclist

People all across the country are turning to bicycling as a creation, or as a source of healthful exercise, or as an alternative to driving. In recent years bicycle sales have surpassed that of cars. Even though you do not consider cycling in your immediate future, you can help your younger sister or brother become energy-savers by pointing out to them some things that younger cyclists do that cause you, as a driver, to have to brake or otherwise waste highway fuel.

Remind them that although the laws in some states consider a bicycle to be a vehicle equal to cars and trucks, when a bike is in a collision with a car or truck, it is far from being equal. In the last analysis, operating a bike is much the same as operating a car. Rights should be asserted cooperatively as dictated by good common-sense judgment.

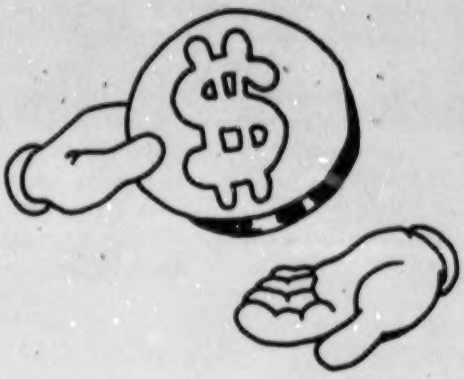
LEARNING ACTIVITIES

Tip 6.

1. Describe how turning right-on-red affects the safety of pedestrian and fuel economy.
2. List two or more hazards that a bicyclist might cause to make drivers waste fuel.
3. Why do you suppose that parallel gratings on drains are considered to be dangerous to bicyclists?
4. Do you think that bicyclists should be able to use city sidewalks as bikeways? What is your opinion concerning bikers' use of interstate highways?

TIP 7. FUEL YOUR CAR SAFELY

Since gasoline prices average from about five to eight cents more per gallon at full service islands than at self-service islands, you will probably be doing a considerable amount of pumping your own gasoline.



Any passenger or driver should make it a point to put out any "smokes" before pulling up to the island. Gasoline is extremely volatile and its fumes ignite easily. Since the fumes spread about quickly, a smoke going inside a car might be an invitation for fire or an explosion. People who ignore this important safety regulation endagner themselves and everyone near them.

If you are filling up and the nozzle on the delivery hose is equipped with an automatic cutoff, be certain that you stop pumping gas when it is activated. There are two good reasons for this suggestion: (1) to override the automatic cutoff invites expensive and wasteful spillage, and (2) it also creates a hazard to the safety of the driver, the passengers, and all other people in the vicinity. You can be assured that the station will charge you for gasoline that is pumped — whether it goes into your tank or on the station's apron.

When using a nozzle that is not equipped with an automatic cutoff, listen while the fuel goes into the filler pipe. When it sounds as if the filler pipe is holding gasoline, stop pumping.

Another reason to stop short of the overflow point is that gasoline expands as it becomes heated. An overfull tank with gasoline in the filler pipe invites loss due to expansion resulting from heat. As the gasoline comes out the overflow pipe, it is creating a dangerous fire hazard. It is also costing you money.

Whether you are in for a "fill up" or not, when you have pumped the desired quantity of gasoline, be certain that the pump has stopped delivering gasoline

before you extract the nozzle. Otherwise, dangerous and expensive spillage might result. Then be particularly careful to see that your filler cap is properly replaced. It is expensive to you and dangerous to others to leave a gallon or so of your recently purchased gasoline on the station's apron if you drive off with the filler cap not replaced or not properly sealing the filler pipe. Even if you elect to use full service islands, you can make certain that the station attendant follows the previous suggestions.

You will want to consult your owner's manual or ask your station operator to find out what the recommended octane for your car is. Gasoline with a too-low octane rating will produce a ping when your engine is placed under strain. Such pinging, if permitted to be sustained, can damage your engine. The use of an octane rating too high wastes money and will not produce more power or improve fuel economy. Such expert automobile mechanics follow a rule-of-thumb guide that says if the engine pings, stop using that grade of gasoline.

Gasoline weighs about eight pounds per gallon. If your car has a capacity of 26 gallons, a full tank adds about 208 pounds to the weight that your engine must move. Just the additional weight of a full tank can cost you almost ½ mpg. Unless you are going on a trip that is long, it is not to your benefit to keep your tank full at all times. By waiting until the fuel indicator drops to ¼ tank or less, you will reduce the likelihood of spillage when you refill.

During the gasoline shortage experienced in the summer of 1974, many people were carrying extra gasoline in containers in the trunk compartment or passenger compartment. They should have realized that such a practice makes a car a potential bomb.

There are several other things that you should check, or have checked, at service stations. Since these things are important to money and fuel savings, do not overlook them.

See TIP #1 Maintain Systematic Car Care.

LEARNING ACTIVITIES

Tip 7.

1. Observe a self-service fuel station for at least 30 minutes and report on the number of smart fuelers and the number of not-so-smart fuelers. In the latter case, cite the unsmart things that were done.
2. Maintain a log of observations for a period of two weeks. Make a report on your observations about the number of drivers who overfilled and/or who forgot to replace the filler line cap properly.
3. Consult a resource and make a report on the meaning of octane.
4. Why should "smoke" be put out before stopping at a self-service island?

SUMMARY

The United States alone has more than 100 million passenger cars. Nebraska had 1,454,386 passenger cars in 1978. To meet our needs for energy obtained from crude oil, our country uses 17 million barrels of crude every day. About five million barrels are used each day for our cars. A barrel holds 42 gallons, that means that our cars use 210,000,000 gallons of crude oil products every day. One factor in the energy crisis is that in recent years our oil production has been going down. Instead of producing more oil, we are producing less. It is a simple matter to produce more oil. Storage facilities are needed, additional refineries are needed, more oil sources must be found, and means of transporting the oil and oil products are needed.

There are many things about which the driver of a private car should and will be concerned. First, if gasoline is rationed, you will only get a certain amount of gasoline. You will be concerned with how to use it because when your allotment is used, it is gone until the next allotment.

If you have to earn the money to pay for the gasoline you use in your car it will not take you long to see another way in which the energy shortage concerns you. Prices for gasoline have been increasing steadily in the past few years. If increased taxes are put on gasoline to discourage its use, you will be concerned.

One more way in which the fuel shortage concerns you is that you can do your share in saving fuel. You are a socially responsible citizen who shares the road with millions of other citizens, so you should also share the load in energy conservation. If all drivers do their part, then geologists will have more time to find new supplies of oil and engineers will have time to devise ways to get the oil to us. The oil industry will have time to build refineries and increase storage places. Technologists will have time to discover new kinds of fuel for vehicles.

The gasoline-fueled internal combustion engine is predicted to be the primary source of private vehicle power until at least the year 2000. Since you are a driver and enjoy driving, you can see that those people in the future years will want to drive too.

In 1974, the oil-exporting nations collected more than 100 billion dollars. Consumers in the United States paid approximately one-fourth of that amount (25,000,000,000).

If one million dollars would create 40 jobs paying $25,000 a year, you can see the effect that the 25 billion, we are spending on oil, creates on our own economic scene. If we can eliminate our need for foreign oil, we will have enough money at home to create almost one million (1,000,000) jobs at $25,000 per year. The 1976 salary of the United States Pesident was $200,000. At that rate, the amount of money we spend in one year for imported oil would pay the President for 125,000 years.

Before you rush out and purchase a large or small car, consider the trade-offs of safety and fuel economy. Whereas small cars consume less fuel per mile, large cars tend to be safer when involved in serious accidents, the percentage of accidents in which death or serious injury was involved is over three times as great as foreign compact cars as for domestic luxury models. Since speed is a contributing factor in many accidents, your choice might be a larger car if you do most of your driving at higher speeds. If most of your driving is urban, a small car might be sufficient transportation.

Economy can also be achieved through proper driving procedures and car care. This is one of the easiest and quickest methods of conservation available to the consumer. Each driver must make the decision to conserve fuel by determining driving needs and method of transportation.